PPN Gamma Results from the NEAR Conjunction

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ABSTRACT: On February 19, 1997 the Near Earth Asteroid Rendezvous (NEAR) spacecraft passed solar conjunction on its way to encounter with asteroid Mathilda. The X-band ranging system on board the spacecraft made it possible to obtain data very close to the sun and reduced the effect of plasma delay by an order of magnitude relative to the previous best space test of gravitational delay from the Viking landers. The range precision was one meter, though unmodeled plasma fluctuations and spacecraft position noise limited the data to about 25 meter average accuracy. The data were fit to a trajectory model that included stochastic parameters to account for solar plasma fluctuation and spacecraft jitter, as well as the PPN parameter gamma to scale the gravitational time delay. Results for gamma are consistent with the predictions of General Relativity with an uncertainty less than 0.1 percent.